

NEW RECORDS OF IMMIGRANT BARK BEETLES (COLEOPTERA: SCOLYTIDAE) IN NEW YORK: ATTRACTION OF CONIFER-FEEDING SPECIES TO ETHANOL-BAITED TRAP LOGS¹

E. Richard Hoebeke²

ABSTRACT: A 1993 survey for the recently detected pine shoot beetle, *Tomicus piniperda*, in New York, conducted by Division of Plant Industry field personnel, New York State Department of Agriculture and Markets, has yielded specimens of two other non-indigenous bark beetles (Scolytidae). Trap logs of *Pinus sylvestris* and *P. resinosa*, baited with 95% ethanol, were placed at 100 sites across New York state, particularly in high risk areas. Pine shoot beetle was collected at 12 sites in 5 counties of western New York. *Pityogenes bidentatus*, a Palearctic species first detected in North America in New York in 1989, was trapped at two new localities in western New York. The European *Hylastes opacus*, known previously in North America from a single locality on Long Island, New York, was trapped at 32 sites in 22 counties throughout the state. Localities for all new records are listed and plotted on distribution maps. North American interception records, native distribution, economic importance, and diagnostic features for *H. opacus* are provided, and an existing key to North American *Hylastes* is modified to include this new adventive member of the fauna. Data on relative abundance are provided for other species of conifer-feeding bark beetles that were trapped, which included: *Dendroctonus terebrans*, *Dendroctonus valens*, *Dryocoetes autographus*, *Gnathotrichus materiarius*, *Hylastes porculus*, *Hylurgops rugipennis pinifex*, *Ips grandicollis*, *Ips pini*, *Orthotomicus caelatus*, *Pityophthorus* sp. prob. *puberulus*, and *Polygraphus rufipennis*.

The pine shoot beetle, *Tomicus piniperda* (L.), was first detected in North America in Ohio in 1992, and is now established in at least 106 counties in six states of the U.S. (Illinois, Indiana, Michigan, Ohio, Pennsylvania, and New York) and in southern Ontario of Canada (Wheeler 1993; unpublished data). In response to the threat of this imported Old World forest pest, the Division of Plant Industry, New York State Department of Agriculture and Markets, initiated a trapping survey to determine its current distribution.

As a result of *ad hoc* federal and state surveys for pine shoot beetle, various sites in at least 10 counties of western New York are now known to be infested, 8 of which were added in 1993 (see Map 1). Federal regulatory efforts continued in 1993 with delimiting surveys near known infested areas and detection surveys around selected high-risk ports of entry.

MATERIALS AND METHODS

The 1993 pine shoot beetle survey in New York was conducted during a 10-12 week period – from egg laying (mid-March) to adult pre-emergence

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² Department of Entomology, Cornell University, Ithaca, New York 14853

from galleries (early to mid-June) – using trap logs baited with 95% ethanol. Traditional trap trees (felled) and trap logs have been used successfully in Europe for well over a century for monitoring and, in some instances, controlling populations of economically important bark beetles.

Two hundred logs (3-6" diam., 24" long) cut from Scotch pine (*Pinus sylvestris* L.) and red pine (*P. resinosa* Aiton) were obtained from the New York State Department of Environmental Conservation. One trap log of each pine species was placed in suspect sites at 100 locations throughout the state. These sites were situated primarily along Lake Erie, Lake Ontario, the St. Lawrence Seaway, the Hudson River waterways, Long Island, and also at a few inland sites. The sites that were selected were primarily unmanaged or poorly managed stands of Scotch pine, generally 12-20 feet high, including overgrown Christmas tree areas, reforestation plantings, windbreaks, shelterbelts, or wildlife plantings (Div. Plant Industry Memorandum, dated March 19, 1993). A 35mm plastic film container, containing polyester cotton fill saturated with 95% ethanol, was placed between and touching both trap logs at each site. This bait container, with the top lid securely snapped on, was placed top down on the ground.

Beginning in mid- to late-June 1993 for each of the trap sites, Division of Plant Industry field personnel stripped the bark from the trap logs on site, and extracted and placed all adult beetles in vials with isopropyl alcohol. Each vial was labelled with the appropriate site number (Inspector #-County #-Township #) and date of collection. Vials of specimens were sent to the author, who mounted, labelled, and identified all specimens; these are deposited in the Cornell University Insect Collection.

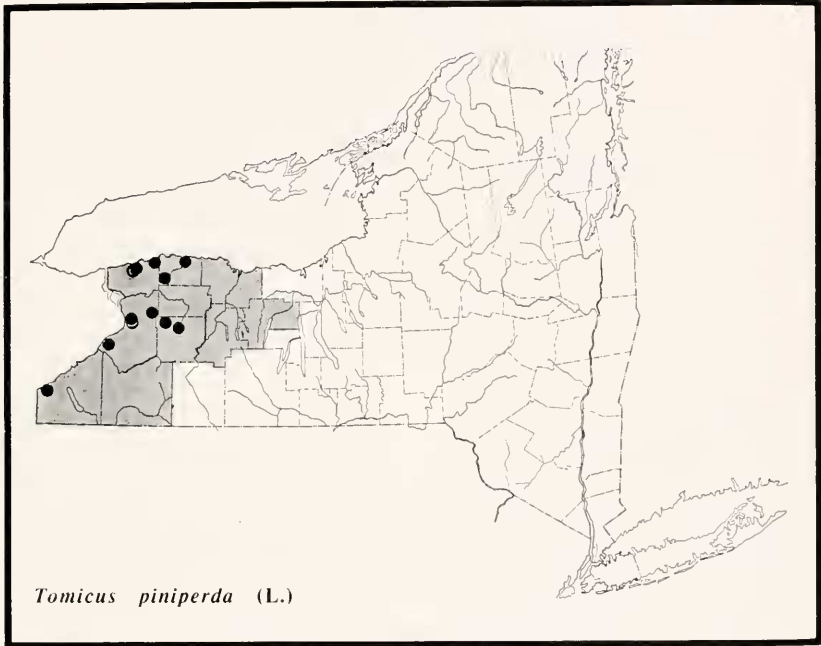
RESULTS: RECORDS OF IMMIGRANT BARK BEETLES IN NEW YORK


A total of 1,772 adults, predominantly bark beetles (Scolytidae) (96%), were extracted from baited trap logs placed at 80 sites in 33 counties of New York State in early 1993. Although 100 sites were selected, samples were examined from only 80 sites due to loss from vandalism by man and wildlife, and other factors. The significant findings of this trap survey are summarized below. All bark beetles species collected and identified from the survey are listed in Table 1.

Tomicus piniperda (L.)

No new counties were added to the known list of infested counties of western and central New York, but specimens of pine shoot beetle were extracted from baited trap logs at 12 sites in 5 counties (see Map 1) within the infested range of the species in New York.

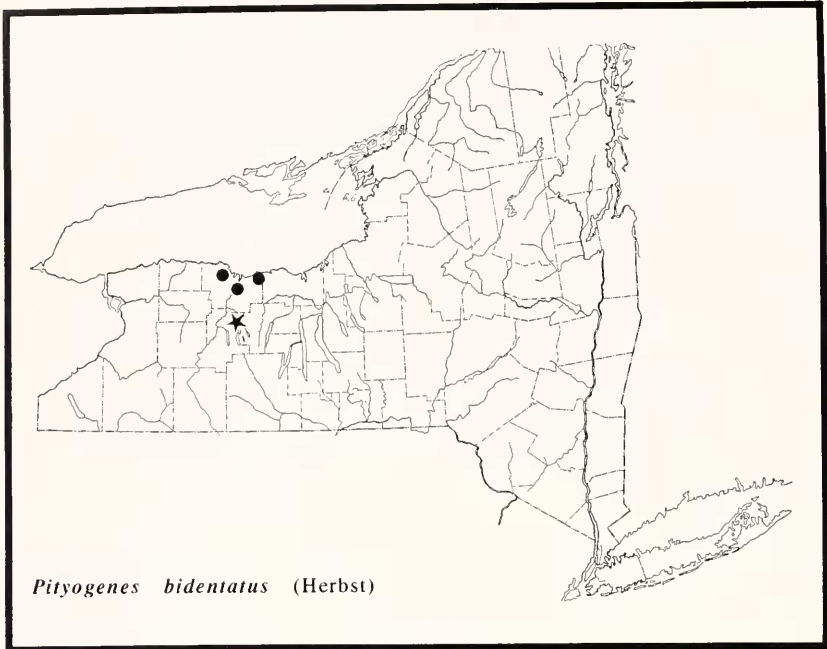
These sites (counties and townships) are: *Chautauqua Co.*, Ripley; *Erie Co.*, Alden, Brant, Orchard Park, West Seneca; *Niagara Co.*, Newfane (2 different sites), Somerset; *Orleans Co.*, Carlton, Shelby; and *Wyoming Co.*, Bennington, Orangeville.



Map 1. Known New York distribution of *Tomicus piniperda* (L.); shaded area  denotes known infested counties and solid circles (●) = new records reported herein.

Pityogenes bidentatus (Herbst)

This adventive scolytid, known in the European literature as the two-toothed bark beetle, was originally recorded in North America from Livingston Co. (Lima), New York, collected under bark of Bosnian pine (*P. leucoderma*) in a nursery (Hoebeke 1989). Another North American record has come to the attention of the author: Brighton (Monroe Co.), New York (a suburb of Rochester), taken from Austrian pine (*P. nigra*) at a private residence in 1992 (E. R. Hoebeke, unpubl. data). Additional specimens of *P. bidentatus* were extracted from trap logs at 2 sites in Monroe County (Parma and Webster) during 1993. These additional records clearly indicate establishment of this Palearctic bark beetle in New York (see Map 2).



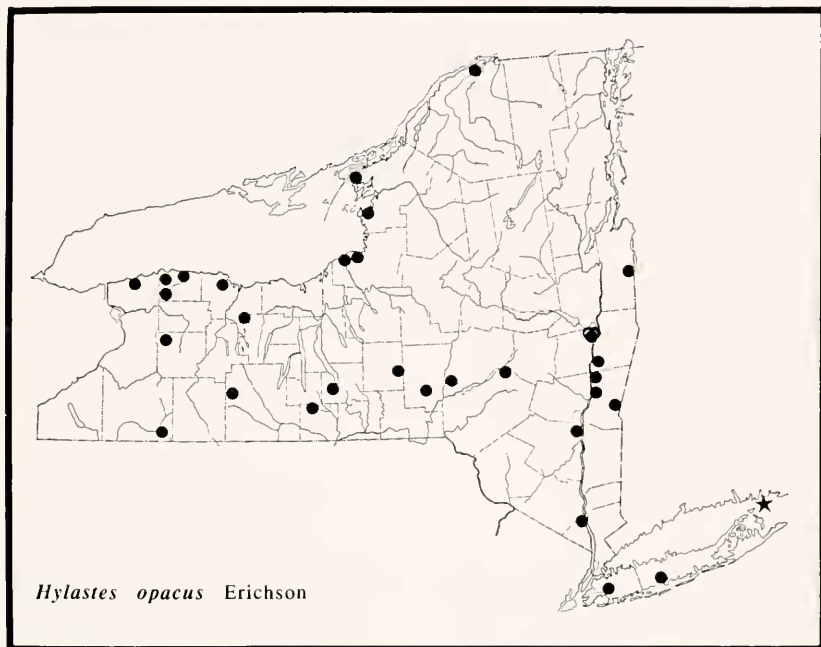
Map 2. Known North American distribution of *Pityogenes bidentatus* (Herbst); Solid star (★) = original detection record and solid circles (●) = new records reported herein.

Hylastes opacus Erichson

The only North American record of this Palearctic species is based on a series of specimens collected by T. W. Phillips near the eastern tip of Long Island on Fisher's Island, Suffolk Co., New York, 23 May 1989, from an *Ips* pheromone trap (Wood 1992).

The 1993 trapping survey for pine shoot beetle yielded specimens of *H. opacus* from 32 sites in 22 counties across New York State (see map 3).

The new locality records (counties and townships) for this immigrant bark beetle are (in alphabetical order by county): *Albany Co.*, Albany City (two different sites), Colonie; *Cattaraugus Co.*, Olean; *Chemung Co.*, Veteran; *Chenango Co.*, Oxford; *Columbia Co.*, Hillsdale, Kinderhook, Stockport; *Cortland Co.*, Cincinnatus; *Delaware Co.*, Harpersfield; *Jefferson Co.*, Cape Vincent, Henderson; *Montiøe Co.*, Mendon, Parma; *Nassau Co.*, Hempstead; *Niagara Co.*, Newfane; *Orleans Co.*, Carlton, Shelby, Yates; *Oswego Co.*, Oswego, Scriba; *Otsego Co.*, Butternuts; *Rensselaer Co.*, East Greenbush; *Rockland Co.*, Stony Point; *St. Lawrence Co.*, Massena; *Steuben Co.*, Hornellsville; *Suffolk Co.*, Islip; *Tompkins Co.*, Newfield; *Ulster Co.*, Kingston; *Washington Co.*, Salem; and *Wyoming Co.*, Bennington.



Map 3. Known New York distribution of *Hylastes opacus* Erichson. Solid star (★) = original detection record and solid circles (●) = new records reported herein.

Additional locality records for *H. opacus* in the northeastern United States are reported in a companion paper by Rabaglia and Cavey (1994).

For nearly a 10-year period, 1978-1987, specimens of *H. opacus* were occasionally intercepted at major U.S. ports of entry. At least 5 interception records are documented in the "List of Intercepted Plant Pests," compiled by the U.S. Department of Agriculture. All specimens found during inspection were associated with pine dunnage (*Pinus* spp.) originating in various European countries (Belgium, Germany, and Great Britain), and destined for U.S. entry points (Ohio, Oklahoma, Tennessee, and South Carolina). During 1939-1977, *H. opacus* was not found during inspection at U.S. ports.

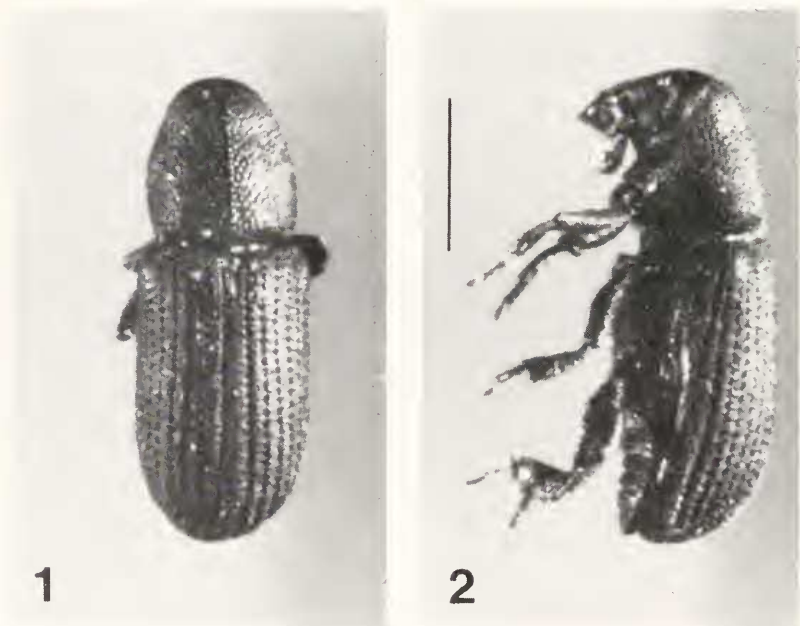
Hylastes opacus, widely distributed in the Palearctic region, breeds in the bark of stumps or at the bases of unhealthy *Pinus* spp., chiefly Scotch pine (*P. sylvestris*). It occasionally infests the bark of other conifers (Browne 1968). Because adults will feed on the tender bark near the root collars of seedlings and transplants, often girdling them, the species is frequently considered a noxious pest of nurseries and pine plantations, not only killing small plants but

exposing older trees to infestation by wound parasites such as *Fomes* (Basidiomycetes, Polyporales: Polyporaceae) (Browne 1968).

The genus *Hylastes* Erichson is generally confined to the Holarctic region, with 15 species occurring throughout the coniferous forests of North and Central America south to Honduras. An additional dozen or more species are found in the coniferous forests of north Africa, Europe, and Asia (Wood 1982).

Hylastes opacus (Figs. 1-2) can be distinguished from most North American members of the genus (except for *H. exilis* Chapuis and *H. tenuis* Eichhoff, see key below) chiefly on the basis of its small size and certain other structural features. Adults are generally 3.0 mm or smaller (range 2.5-3.0 mm) and are recognized by the following combination of characters:

Frons without longitudinal carina; frons and vertex closely and coarsely punctured; pronotum as long as wide and constricted anteriorly; interstriae flat, wider than striae; elytral declivity with erect setae; and body black, with antennae and legs reddish brown and elytra dull.



Figs. 1-2. *Hylastes opacus*. 1, dorsal habitus. 2, lateral habitus. Scale line = 1.0 mm.

Couplet #3 of Wood's (1982) key to the species of *Hylastes* of North and Central America is modified here to facilitate identification of *H. opacus*.

(Couplets 1-2 unmodified).

3(2). Pronotum quadrate, as long as wide, distinctly constricted anteriorly (Fig. 1); interstriae, at least at base, wider than striae, flattened, each bearing a slightly confused row of fine setiferous granules; adventive in eastern United States (New York); 2.5-3.0 mm **opacus** Erichson

– Pronotum slightly elongate, approximately 1.2 times as long as wide, widest on basal half, sides weakly arcuate, broadly rounded anteriorly; interstriae, at least at base, as wide as striae, feebly convex, each bearing a uniseriately or slightly confused row of fine to large, rounded, setiferous granules 3a

3a Frons and vertex punctured, interspaces smooth to feebly granulate, median groove feebly indicated or absent; California and Hidalgo to Maryland and Florida; 2.0-2.5 mm 2. **tenuis** Eichhoff

Frons and vertex devoid of punctures, coarsely, closely granulate, lower half usually with a conspicuous median sulcus; Texas to North Carolina and Florida; 2.3-2.7 mm 3. **exilis** Chapuis

(Couplet 4 and remaining couplets unmodified).

The native *H. porculus* Erichson also occurs commonly in the eastern United States, but it differs from *H. opacus* by its much larger size (3.9-5.3 mm) and the presence of a sharply elevated median carina on the frons.

Aspects of the biology, habits, and life history of *H. opacus* and other *Hylastes* spp. occurring in Europe are reviewed by Munro (1926), Chararas (1962), and Scott and King (1974).

DISCUSSION

The rate at which exotic bark beetles are being transported by commerce to establish breeding populations in the United States is becoming a matter of increasing concern. In fact, during 1985-1991 alone, at least 13 species of non-indigenous Scolytidae have become established in the United States (Wood and Bright 1992).

The many exotic bark beetles that are apparently slipping through this country's "first line of defense"—port inspection and quarantine—are jeopardizing North American agriculture and forestry. In addition to the pine shoot beetle (*Tomicus piniperda*), there are other economically important bark beetles that have high potential to become established (Marchant and Borden 1976). Examples include such major pest species as the spruce bark beetle, *Ips typographus* (L.); the red-haired pine bark beetle, *Hylurgus ligniperda* (F.); and the Mediterranean pine engraver, *Orthotomicus erosus* (Wollaston).

In January 1993, the Northeast Exotic Pest Survey Committee (NEPSC), concerned with the prospect that other foreign bark beetles might become established without our knowledge, "selected, researched, and recommended exotic bark beetle pests for a 1994 survey ..." (Cavey 1993). Several economically important species, including those mentioned above, were chosen for this survey, based primarily on interception records (most frequently intercepted pests) at U.S. ports of entry for the past 20 years. United States interception lists of bark and ambrosia beetles demonstrate the ease and frequency with which these pests can enter new ranges and habitats. The mainly wood-boring habits of these beetles make them difficult to detect and allow them to be easily introduced (Marchant and Borden 1976).

The New York trapping survey exceeded its primary objective of detecting populations of the pine shoot beetle. It also resulted in extensive additional records for one of the Palearctic black pine beetles, *Hylastus opacus* – demonstrating its long-term establishment in New York and elsewhere in the Northeast (see Rabaglia and Cavey 1994). Additional records for *Pityogenes bidentatus* also were obtained in western New York from the trap log survey.

Although harmful introductions fluctuate, the cumulative number of foreign non-indigenous species in the United States is climbing steadily and swiftly – creating an increasing economic and environmental burden (Anonymous 1993). If the inevitable is true – that foreign pest species *will* find entry

Table 1. Adult conifer-feeding Scolytidae collected during a 1993 trap log survey for pine shoot beetle, *Tomicus piniperda* (L.), in New York^a.

Species	No. of Specimens	No. of Sites	Endemic	Adventive
<i>Dendroctonus terebrans</i> (Olivier)	1	1	•	
<i>Dendroctonus valens</i> LeConte	1	1	•	
<i>Dryocoetes autographus</i> (Ratzeburg)	49	14	• ¹	
<i>Gnathotrichus materiarius</i> (Fitch)	2	2	•	
<i>Hylastes opacus</i> Erichson	117	32		•
<i>Hylastes porculus</i> Erichson	4	2	•	
<i>Hylurgops rugipennis pinifex</i> (Fitch)	710	53	•	
<i>Ips grandicollis</i> (Eichhoff)	6	6	•	
<i>Ips pini</i> (Say)	28	6	•	
<i>Orthotomicus caelatus</i> (Eichhoff)	699	43	•	
<i>Pityogenes bidentatus</i> (Herbst)	39	2		•
<i>Pityophthorus</i> sp. pb. <i>puberulus</i> (LeC.)	1	1	•	
<i>Polygraphus rufipennis</i> (Kirby)	9	4	•	
<i>Tomicus piniperda</i> (L.)	36	12		•

^a Trap logs consisted of Scotch and red pine; 80 sites in 33 counties throughout New York were sampled (see Materials and Methods).

¹ Holarctic (North American coniferous forests, and northern Europe and Asia).

into this country – then a logical response is for more extensive and more thorough surveys designed to detect introduced species. One of the superior tools for detecting scolytids, as well as for monitoring their distribution and population density, is the use of baited traps. Various trap designs such as stovepipe, barrier, flight intercept, Lindgren multiple-funnel, and Theysohn baited with conifer monoterpenes, and/or ethanol, or pheromone components, are effective in sampling for populations of conifer-feeding bark beetles. The traditional trap trees and logs are also still used for sampling. The United States is especially prone to foreign introductions because of large volume in international trade in agriculture and forest products. States therefore should take the initiative to support and implement these systematic surveys in areas of high risk.

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LITERATURE CITED

- Anonymous**, 1993. Report brief – Office of Technology Assessment, U.S. Congress. September, 4 pp.
- Browne, F. G.** 1968. Pests and diseases of forest plantation trees: an annotated list of the principal insects occurring in the British Commonwealth. Clarendon Press, Oxford. 1330 pp.
- Cavey, J. F.** 1993. [A report]. "Recommended target species for exotic pest survey in the Northeastern region (January 1993)." USDA, APHIS, PPQ. Appendix I.a: 18 pp + attached appendices A-E (i-ix).
- Chararas, C.** 1962. Étude biologique des scolytides des conifères. Ency. Entomol., Ser. A, Bd. 38. 556 pp.
- Hoebcke, E. R.** 1989. *Pityogenes bidentatus* (Herbst), a European bark beetle new to North America (Coleoptera: Scolytidae). J. New York Entomol. Soc. 97: 305-308.
- Marchant, K. R. and J. H. Borden.** 1976. Worldwide introduction and establishment of bark and timber beetles (Coleoptera: Scolytidae and Platypodidae). Simon Fraser Univ. Pest Manage. Pap. No. 6. 76 pp.
- Munro, J. W.** 1926. British bark-beetles. For. Comm. Bull. No. 8. H. M. Stationary Office, London, 77 pp.
- Rabaglia, R. J. and J. F. Cavey.** 1994. Note on the distribution of the immigrant bark beetle, *Hylastes opacus* Erichson, in North America (Coleoptera: Scolytidae). Entomol. News. 105: 277-279.

- Scott, T. M. and C. J. King. 1974. The large pine weevil and black pine beetles. For. Comm. Leaflet 58. 12 pp.
- Wheeler, A. G., Jr. 1993. Pine shoot beetle 1993 update. Pennsylvania Christmas Tree Grower's Assoc. Bull. No. 201:4-5.
- Wood, S. L. 1982. The bark and ambrosia beetles of North and Central America (Coleoptera: Scolytidae), a taxonomic monograph. Great Basin Nat. Mem. 6:1-1359.
- Wood, S. L. 1992. Nomenclatural changes and new species in Platypodidae and Scolytidae (Coleoptera), Part II. Great Basin Nat. 52: 78-88.
- Wood, S. L. and D. E. Bright. 1992. A catalog of Scolytidae and Platypodidae (Coleoptera), Part 2: Taxonomic Index. Volume A (pp. 1-833), Volume B (pp. 835-1553). Great Basin Nat. Mem. 13.
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EDITOR'S NOTE

The above paper and the following paper are published 'back to back', but separately, because the three authors, quite independently and nearly at the same time, discovered new North American distributional data for the immigrant bark beetle, *Hylastes opacus*. In each case, data were developed from separate sources: one from a comprehensive trap log survey in New York, the other from *Ips* pheromone-baited Lindgren funnel traps in Maine and Vermont. The authors involved decided it would be more appropriate to publish each paper separately rather than joining them into one manuscript.

H.P.B.